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CLAIMS

(59)

1. An isolated DNA sequence from the promoter region upstream of a nectary-specific expressed sequence, which nectary-specific expressed sequence encodes a protein comprising the amino acid sequence given in SEQ ID NO:1, or a protein that has at least 60% homology to the amino acid sequence given in SEQ ID NO:1.
2. An isolated DNA sequence according to claim 1, wherein the nectary-specific expressed sequence has:
 - a) a nucleotide sequence given in SEQ ID NO:4, or
 - b) a nucleotide sequence which hybridises with (a) or with a fragment of (a) under the following conditions: pre-hybridisation for 1h at about 65 °C in a solution of Church and Gilbert, comprising 0.5 M sodium phosphate, pH 7.2, 1 mM EDTA, 1% BSA, 7% SDS, followed by hybridisation in the same solution for 18h at about 65 °C, followed by washing three times in 0.1 x SSC, 0.1% SDS at about 65 °C for 30 min., or
 - c) a nucleotide sequence that has at least 85% homology to the nucleotide sequence of a).
3. An isolated DNA sequence according to claim 1 or 2, obtained from a plant of *Petunia hybrida*, the sequence consisting essentially of the sequence given in SEQ ID NO:7, or a functional fragment thereof having promoter activity.
4. An isolated DNA sequence encoding a protein comprising the amino acid sequence given in SEQ ID NO:1, or a protein having at least 60% homology with the amino acid sequence given in SEQ ID NO:1, which protein, when ectopically expressed, plays a role in sugar metabolism, the expression of the DNA sequence being predominantly confined to the nectaries of a plant.
5. An isolated DNA sequence according to claim 4 having:
 - a) a nucleotide sequence given in SEQ ID NO:4, or

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- b) a nucleotide sequence that hybridises with the nucleotide sequence of (a) or with a fragment of (a) under the hybridisation conditions as defined in claim 2, or
 - c) a nucleotide sequence that has at least 85% homology to the nucleotide sequence of a).
6. An isolated DNA sequence that results from the sequence shown in SEQ ID NO:4 by insertion, deletion or substitution of one or more nucleotides, including naturally occurring variations or variations introduced by targeted mutagenesis or recombination, wherein the DNA sequence encodes a protein exhibiting the same function as the protein according to claim 4.
7. An isolated DNA sequence according to claim 4 having a nucleotide sequence given in SEQ ID NO:4, said sequence being produced by current DNA synthesis techniques.
8. An isolated DNA sequence comprising the coding region for a signal peptide, wherein the information contained in the DNA sequence permits, upon translational fusion with a DNA sequence encoding a protein that is expressed in nectaries, targeting of the protein to nectar.
9. An isolated DNA sequence according to claim 8, having:
- a) a nucleotide sequence given in SEQ ID NO:6 obtained from a plant of *Calluna vulgaris*, or
 - b) a nucleotide sequence that hybridises with the nucleotide sequence given in a), under the hybridisation conditions as defined in claim 2, or
 - c) a nucleotide sequence that has at least 95% homology to the nucleotide sequence of a).
10. A recombinant double-stranded DNA molecule comprising an expression cassette comprising the following constituents:
- i) a promoter functional in plants,
 - ii) a DNA sequence coding for a protein as defined in any of

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- claims 4 to 7 which is fused to the promoter sequence in sense or antisense orientation, and optionally
- iii) a signal sequence functional in plants for the transcription determination and polyadenylation of an RNA molecule.
11. A recombinant double-stranded DNA molecule comprising an expression cassette comprising the following constituents:
- i) a promoter functional in nectaries of plants,
 - ii) a DNA sequence coding for a protein which is fused to the promoter sequence in sense or antisense orientation, and optionally
 - iii) a signal sequence functional in plants for the transcription termination and polyadenylation of an RNA molecule.
12. A recombinant double-stranded DNA molecule comprising an expression cassette comprising the following constituents:
- i) a promoter functional in nectaries of plants,
 - ii) a DNA sequence encoding a protein which is fused to the promoter,
 - iii) a DNA sequence encoding a signal peptide that targets the recombinant protein to nectar, which is translationally fused to the DNA sequence encoding the recombinant protein, and optionally
 - iv) a signal sequence functional in plants for the transcription termination and polyadenylation of an RNA molecule.
13. A recombinant double-stranded DNA molecule according to claim 11 or 12 wherein the promoter is as defined in any of claims 1-3.
14. A recombinant double-stranded DNA molecule according to claim 12 or 13 wherein the DNA sequence encoding a signal peptide is as defined in claim 8 or 9.
15. A process for producing a transgenic plant exhibiting excretion of a recombinant protein in its nectar, comprising:
- i) introducing in a plant cell a recombinant double-stranded DNA-molecule as defined in any of claims 12 to 14, wherein the recombinant protein is excreted in nectar,
 - ii) regenerating plants from the transgenic cell, and

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- iii) selecting transgenic plants.
16. A process for producing a transgenic plant exhibiting a modified nectar composition, comprising:
- i) introducing in a plant cell a recombinant double-stranded DNA-molecule as defined in any of claims 11 to 14, wherein the recombinant protein interferes with metabolic pathways in the nectaries,
 - ii) regenerating plants from the transgenic cell, and
 - iii) selecting transgenic plants.
17. A process for producing a transgenic plant exhibiting a modified nectar secretion, comprising:
- i) introducing in a plant cell a recombinant double-stranded DNA-molecule as defined in any of claims 11 to 14, wherein the recombinant protein interferes with sink strength of nectaries,
 - ii) regenerating plants from the transgenic cell, and
 - iii) selecting transgenic plants.
18. A process for producing a transgenic plant exhibiting a modified nectary development, comprising:
- i) introducing in a plant cell a recombinant double-stranded DNA-molecule as defined in claims 11 or 14, wherein the recombinant protein interferes with the development of nectaries,
 - ii) regenerating plants from the transgenic cell, and
 - iii) selecting transgenic plants.
19. A process for producing honey from modified nectar of transgenic plants, comprising:
- i) producing a transgenic plant by introducing in a plant cell a recombinant double-stranded DNA molecule as defined in any of claims 11 to 14, regenerating plants from the transgenic cell, and selecting modified plants exhibiting the excretion of nectar with a modified composition,
 - ii) allowing insects, preferably bees, to collect nectar from the transgenic plants and to process the nectar into honey.
20. A process for producing a recombinant gene product from honey, comprising:
- i) producing a transgenic plant by introducing in a plant cell

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- a recombinant double-stranded DNA molecule as defined in any of claims 12 to 14, regenerating plants from the transgenic cell, and selecting modified plants exhibiting excretion of the recombinant gene product in nectar,
- ii) allowing insects, preferably bees, to collect nectar from the transgenic plants and to process the nectar into honey, and
 - iii) isolating and purifying the gene product from the honey.
21. A process for producing a metabolite from honey, comprising:
- i) producing a plant that excretes this metabolite in nectar and which plant has been produced by current breeding and selection methods,
 - ii) allowing insects, preferably bees, to collect nectar from the selected plants and to process the nectar into honey, and
 - iii) isolating and purifying the metabolite from the honey.
22. Micro organisms containing DNA sequences according to one or more of claims 1 to 9.
23. Micro organisms containing recombinant DNA molecules according to any of claims 10 to 14.
24. A plant cell or plant cell culture transformed with one or more DNA sequences according to claims 1 to 9.
25. A plant cell or plant cell culture transformed with recombinant DNA molecules according to any of 10 to 14.
26. A plant consisting essentially of the plant cells of claims 24 or 25.
27. A transgenic plant obtained by the process of any of claims 15 to 18.
28. Seeds, tissue culture, plant parts or progeny plants derived from a transgenic plant according to claim 27.
29. Honey obtained from nectar from transgenic plants, which nectar has a modified composition.

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30. Honey obtained from nectar from transgenic plants, which nectar comprises a recombinant gene product.

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